Monitoring Plan

For

Everglades Protection Area

Water Conservation Area 1 (WCA1)

Project: EVPA

Effective Date:

July 10, 2006

Water Quality Monitoring Division
Environmental Resource Assessment Department
South Florida Water Management District

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2. GLOSSARY

COC	Chain of Custody
DCS	Depth to Consolidated Substrate
DGPS	Differential Global Positioning System
EB	Equipment Blank
EVPA	Everglades Protection Area
FAC	Florida Administrative Code
FCEB	Field-cleaned Equipment Blank
FDEP	Florida Department of Environmental Protection
FOC	Field Operations Center
FSQM	Field Sampling Quality Manual
GPS	Global Positioning System
LCS	Laboratory Control Spike
LIMS	Laboratory Information Management System
MDL	Method Detection Limit
MS	Matrix Spike
NGVD	National Geodetic Vertical Datum
NTU	Nephelometric Turbidity Unit
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/ Quality Control
RPD	Relative Percent Difference
RS	Replicate Sample
SFWMD	South Florida Water Management District
SSAC	Site-specific alternative criterion
SOP	Standard Operating Procedure
TOC	Technical Oversight Committee
TP	Total Phosphorus
USFWS	United States Fish and Wildlife Service
WCA	Water Conservation Area
WQM	Water Quality Monitoring Division

3. PROJECT DESCRIPTION

3.1 Introduction and Background

This document serves as a reference for surface water quality monitoring in Water Conservation Area 1 (WCA1) of the Everglades Protection Area (EVPA) project. The EVPA project consists of sampling stations in all three Water Conservation Areas: WCA1 (Arthur R. Marshall Loxahatchee National Wildlife Refuge), WCA2, and WCA3. Sampling in WCA1 began in June 1978 under project CAWQ (WCA Water Quality Investigation) and continued until July 1983. Sampling resumed in December 1993 as the EVPA project. The guidance contained in this document will assist in maintaining consistency in sampling locations, parameter lists, and frequencies as well as providing documentation of the project scope and an ongoing historical perspective.

3.2 Active Mandates and Permits

The Everglades Settlement Agreement (1991, 1995) governs the sampling requirements of this project. The Settlement Agreement specifies that interim and long-term phosphorus concentration levels for WCA1 must be met by February 1, 1999, and December 31, 2006 respectively. These phosphorus levels vary as a function of average water stage measured at gauging stations 1-7, 1-8C, and 1-9 within Area 1; level calculations are applicable for average stages ranging from 15.42 to 17.14 feet (NGVD). Appendix B of the settlement agreement describes how the geometric means are to be calculated and compared against the interim and long-term phosphorus levels calculated from equations presented in Attachments I and II respectively.

3.3 Purpose and Scope

The Everglades Settlement Agreement includes provisions for water quality, water supply, and flood control plans for the Water Conservation Areas. The District has initiated and maintained this monitoring program to: (1) determine water quality status and trends; (2) assess compliance with federal and state water quality statutes, the Everglades Forever Act, and the Everglades Settlement Agreement; (3) guide decisions to restore the ecological structure and function of the Everglades; and (4) minimize duplication, ensure monitoring methods and data interpretation are uniform, and provide a comprehensive framework for data interpretation.

3.4 Duration

3.4.1 Initiation Conditions

The monitoring described in this document was initiated December, 1993 in response to the Everglades Settlement Agreement.

3.4.2 Modification or Termination Conditions

The monitoring of WCA1 is currently conducted jointly by the United States Fish and Wildlife Service (USFWS) and the District under a three-year contract (ML040283) with the District. The original contract (C-

12738) began October 1, 2000 and expired September 30, 2003 and was renewed for an additional three-year period under contract ML040283. Monitoring will continue as long as mandated by the Everglades Settlement Agreement and Consent Decree.

4.0 GEOGRAPHIC LOCATION

4.1 Regional Area

The entire shaded region depicted in Figure 1 identifies the EVPA project area. Water Conservation Area 1 is the northern most of the water conservation areas and is located south of the West Palm Beach Canal and north of the Hillsboro Canal in Palm Beach County.

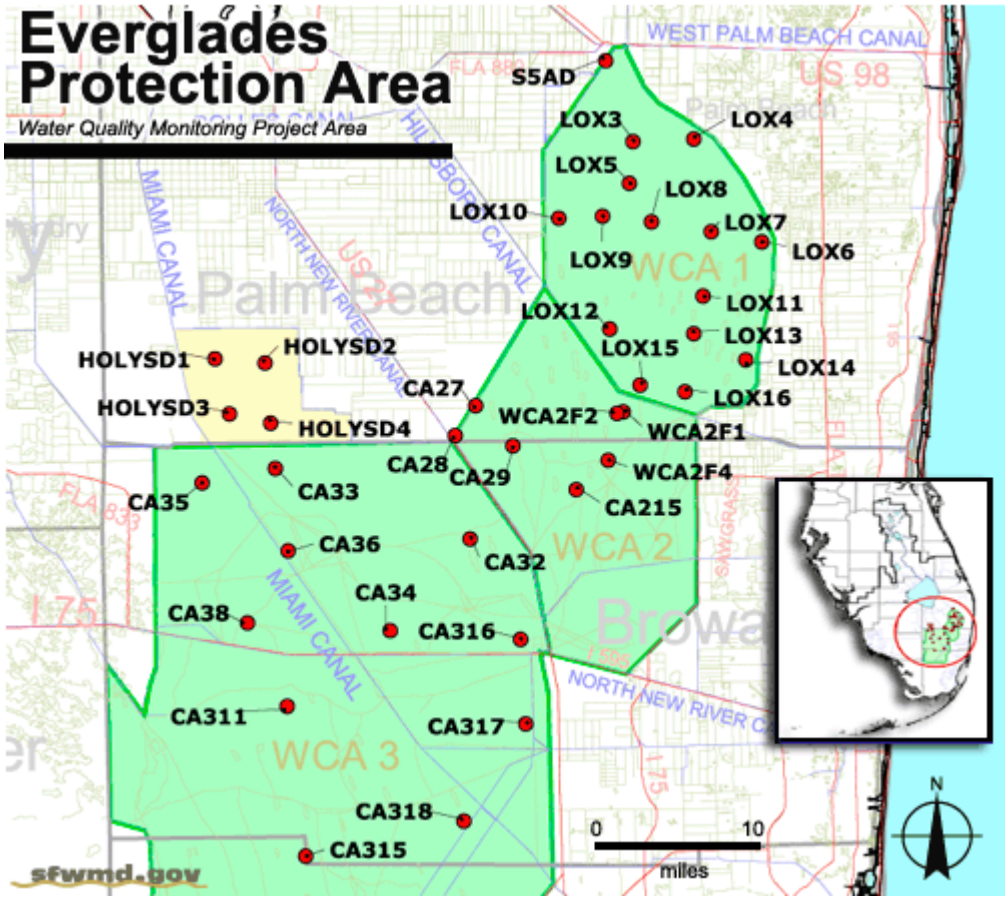

Figure 4-1: Water quality monitoring stations for the EVPA project.

4.2 Sampling Locations

There are a total of 14 marsh monitoring locations in WCA1 and one station (S5AD) located in the distribution network. These stations provide the monitoring data for this plan. All the sampling sites are registered in District's Laboratory Information Management System (LIMS). Site-specific coordinates are provided in Table 4-2 for each monitoring location.

Table 4.1 Surface Water Quality Monitoring Sites and GPS Coordinates

STATION	GPS LATITUDE*	GPS LONGITUDE*
S5AD	264059.54664	802200.79498
LOX3	263534.99073	802121.00766
LOX5	263326.18401	802128.56679
LOX10	263134.58982	802515.16263
LOX9	263135.71118	802313.15927
LOX8	263126.34056	802016.47794
LOX7	263105.25918	801635.70785
LOX4	263601.72298	801741.47942
LOX6	263021.37863	801348.01059
LOX11	262743.65894	801729.66636
LOX13	262527.91133	801801.35327
LOX14	262411.78886	801443.43358
LOX16	262224.82558	801822.47116
LOX15	262302.21973	802107.31621
LOX12	262550.05024	802248.04911
* The standard positional goal for site coordinates is ±1 meter. This standard can be obtained with a professional grade DGPS system. The coordinates are relative to NAD83 HARN horizontal datum.		
Notes: Trimble Pro XR used to capture coordinates - 101804: S5AD (Not part of the monitoring for Settlement Agreement compliance purposes) - shot just downstream from S5A pump station; Lox 3 - taken by an offset to the center of the four PVC poles marking the station from nearby; all other stations shot after Trimble was plugged into District helicopter's GPS antennae and pilot drifted into center of four poles marking each station.		

Due to the spatial distribution of the monitoring sites, sampling needs to be performed over two consecutive days. In addition, the following sampling sequence must be strictly followed to efficiently use helicopter time and to conserve fuel.

Table 4.2 EVPA Sampling Stations in WCA1

Order	Day 1 Stations	Order	Day 2 Stations
1	LOX3	1	LOX6
2	LOX5	2	LOX11
3	LOX10	3	LOX13
4	LOX9	4	LOX14
5	LOX8	5	LOX16
6	LOX7	6	LOX15
7	LOX4	7	LOX12
8	S5AD		

* A "FCEB" shall be processed in the laboratory each day after processing any station following the first sampling station.

Deviations from the above sampling sequence are permitted if the reason for the deviation is properly documented in the field notes.

Four (4) PVC poles mark each of the 14 compliance stations. The helicopter pilot shall be directed to approach each station from a downwind direction and in a manner that minimizes any disturbance to the sampling area. The landing distance shall depend upon wind and site specific conditions; however, no disturbance induced by the helicopter, including prop-wash, shall occur within 10 m of the sampling station, which includes areas where sample bottles are rinsed.

Sampling from the helicopter will generate disturbances in several forms: (1) resuspension of sediments and floc material resulting from the impact of the pontoons with the sediments; (2) resuspension due to the prop-wash of the rotor; and/or (3) porewater release into the water column due to pressure on the underlying sediment.

The pontoons of the helicopter shall not be used as sampling platforms unless, in the judgment of the sampling team, it is not possible to safely collect a sample wading into the sampling area. This should only occur if water depths[1] exceed 1 m. Under these conditions, the pilot may be directed to idle the helicopter to the sampling station for samples to be collected from the pontoon. Great care must be taken during this maneuver to not cause disturbance to sediments, detritus, or plant material. The samplers must document the reason for this decision and any observed impacts resulting from this maneuver.

4.3 Access

Helicopter transportation to WCA1 for the 2-day monthly sampling event is provided by the District from the Palm Beach International Airport or by Aircoastal Helicopters from the Lantana Airport.

Certain hazards not normally encountered during typical sample collection may occur when using a helicopter to collect samples. Extreme caution must always be used to ensure the safety of passengers and equipment. The following guidelines shall be followed during all sampling expeditions:

- Use extreme caution when approaching the helicopter while the rotor is turning. All long (upright pvc pole) and tall (auto antennae) objects should be kept away from tail and main rotors.
- In general, approach the helicopter from the front where the pilot can see you more clearly, and to avoid the danger of the tail rotor always **walk around the front of the helicopter; never the rear.**
- Measure the water depth before stepping off of the floats.
- Use ear protection at all times.

[1] As defined by depth to consolidated substrate (DCS).

- Keep your feet away from the additional steering unit (located in front of passenger seat in District helicopter) and your hands away from the controls.

5.0 DATA QUALITY OBJECTIVES

5.1 Data Uses, Resolutions, and Conclusions

The data is used to fulfill the purposes listed in Section 3.3. Total phosphorus concentrations from the marsh stations are used to calculate a monthly geometric mean concentration level that is used to compare with limits derived from a Stage-Concentration relationship. These results are reported quarterly in the Settlement Agreement Report for the Technical Oversight Committee (TOC), and reported monthly via the TOC web site.

5.2 Data Quality

Data quality refers to the level of uncertainty associated with a particular data point or value. This is assessed by examining the quality of collection and analysis, determining compliance with method and regulatory requirements, determining precision and accuracy of analysis, and any other background information affecting the data. Data not meeting the quality objectives must be qualified using standard FDEP qualifier codes (F.A.C. 62-160).

Samples are collected in accordance with this Monitoring Plan, the Marsh Sampling Protocol, (Nearhoof, 1996), the FDEP Quality Assurance Rule, 62-160.200 & 62-160.320, F.A.C. and the SFWMD Field Sampling Quality Manual (FSQM). Applicable sections of the FSQM include decontamination (4.2.1, 4.2.3), the method for surface water grab collection (5.3.1, 5.3.2), sampling by helicopter (5.15, 5.15.1, 5.15.2), processing (5.15.5), preservation (5.17), field test methods (6.0) and quality control procedures (7.0).

All monitoring under this project shall also comply with the following WQM SOPs.

- Field Notes and COC Pre-Submittal Review Process
- Field Project Manager Review of Monitoring Event Documentation
- Correction and Storage of COC (Header) Sheets
- Records Storage, Archival and Retrieval

5.3 Parameter and Frequency Rationale

The parameters and monthly frequency were specified in the Settlement Agreement and Consent Decree and are modified per the consensus of the Technical Oversight Committee (TOC).

5.4. Expected Levels and Concern Triggers

The Settlement Agreement stipulates a method for computing the interim and long-term marsh TP concentration levels against which the geometric mean of the

compliance stations is compared. An exceedance occurs if the geometric mean exceeds the compliance limit two or more times in any 12 consecutive months.

Additionally, the EFA directed the FDEP to develop a numerical phosphorus criterion for Class III waters in the EPA.

The Settlement Agreement also requires monitoring of non-phosphorus parameters in the marsh. Data collected for these parameters are compared to Class III criteria specified in Section 62-302.530 of the Florida Administrative Code (F.A.C.). An excursion analysis is performed and reported in the annual South Florida Environmental Report. A site-specific alternative criterion for dissolved oxygen in the EPA was adopted by FDEP on January 26, 2004 and subsequently approved by U.S. EPA as a revision to Florida Water Quality Standards.

6.0 INSTRUMENTATION

N/A

7.0 MONITORING PARAMETERS, DETECTION LIMITS, AND COMPLETENESSTARGETS

Monitoring parameters and frequencies shall be registered in LIMS for each project. Completeness targets, meaning the number of samples successfully collected and analyzed, are set at 95% annually for this project.

7.1 Surface Water

7.1.1 Grab Sample Collection (Surface Water)

Specific protocols[2] are to be followed for: (1) approach to the sample site; (2) selection of correct micro-locale; (3) sample collection; (4) recording of sampling conditions; and (5) low water depths.

Four (4) PVC poles mark each of the 14 compliance-sampling stations in WCA1. Field notes must include distance (m) from helicopter to sample collection location. Sample collection should be within 50 m of the helicopter.

Both samplers must be present during sampling to verify and document the correct sampling technique, depth measurements, field measurements, and conditions that may affect the samples.

There are three different depth values recorded for this project: sample depth, total depth, and depth to consolidated substrate. The total depth is listed as "tdepth" on the header sheet and in the field notes, and is the total

[2] Refer to "A Protocol for Collecting Surface Water Samples in Marshes of the Florida Everglades." Frank L. Nearhoof. May 1996.

depth of the water column. Tdepth is measured by holding the PVC pole is a position such that the white color marking the top of the tip at the base of the pole is just visible above the detrital layer. The sample depth is half of the tdepth (0.5m when tdepth is greater than 1 m) and is listed as "depth" on the header sheet. The depth to consolidated substrate (DCS) is tdepth plus the depth of the detrital layer and is recorded in the field notes as "DCS" (Figure 7.1). Note: tdepth and DCS may be the same value when there is no detrital layer or the tdepth is greater than 1 m.

Frequently there are holes or soft spots in the marsh. The DCS represents a measurement to the depth that provides reasonable support to the sampler and is not intended to include the "holes" or soft spots. DCS values must be corrected by adding .03 m to them to account for the length of the tip at the base of the PVC pole. Tdepth and DCS measurements are obtained after sample collection to minimize disturbance of sediments and floc that may influence the sample.

Generally, sampling from the helicopter pontoon is not acceptable unless water levels are too deep to safely wade to the sampling station. Unless the sampler documents a reason for sampling off of the pontoon, it will be assumed that the DCS at the sampling site was ≤1 meter and the sample could have been collected by wading to the sampling station. If it is necessary to sample from the helicopter pontoon, the pilot shall be directed to idle as close to the sampling station as possible causing minimum disturbance. The instance and reasons for sampling from the helicopter pontoon must be adequately documented in the field notes.

No sample shall be collected at a total depth of < 0.1 m (10 cm). [3] Collecting water samples only at total depths greater than 10 cm is to ensure that the samples do not contain detritus, and the samples are representative of water quality conditions in the marsh, not in an isolated pool. For all total depths >0.2 m, samples are collected into one 2-L bottle and one 1L bottle (1L bottle is used to fill 2L bottle) at each station, and are composited into an 8-L container at the District lab. **When total depth is 0.1 m – 0.2 m, a sample is collected for TPO4 only using a 60 ml sample bottle.** (If additional parameters are requested at this depth, they must be collected using a bottle separate from the 60 mL TPO4-designated bottle). Both collection and sample bottles must be labeled with a station identification number before the samples are collected.

The sample should be representative of the bulk water concentration, including both dissolved and suspended solid forms of the constituent. The sample should include plankton, and other suspended materials that are moving with the undisturbed bulk water. Disturbance is defined as any re-

[3] Refer to "Analysis of Marsh Phosphorus Data from Loxahatchee National Wildlife Refuge." William W. Walker, Jr. March 11, 1999.

suspension of sediment or detritus, or dislodging of periphyton into the water column by the actions of the helicopter, movement of the samplers, or process of sample collection. Samples should not include floating materials that move under the influence of wind, nor settled materials that are suspended under the influence of the disturbed bulk water. The sampling personnel must be cognizant that his/her approach, presence, and movement can cause disturbance of the detrital material.

Visually inspect the sampling location to ensure that such disturbance has not occurred, as evidenced by a cloud of resuspended solids, for example. Continue to closely observe the location to make sure that detritus has not been dislodged from the vegetation, or sediment has not become disturbed by your approach or sampling activity. If the location appears turbid or disturbed, or anomalous materials, such as sediment, periphyton or flocculent materials are noticeable in the collected sample, the sampler must make a determination if this was caused by disturbance. Re-collect samples if the sampling crew determines that the particulates were due to sampling activity disturbance. If the water 2-5 meters away from where the sampler stands is clear, then the site might have been disturbed. To re-collect, move to a new location, re-rinse the bottle, and re-sample. Make sure that the rinsing removes all macro detritus, duckweed, and algae from the bottle.

If, after several attempts, the sample collector is unable to collect a sample without disturbing sediment or detrital material, then the other collector should collect the sample. Document the collector's name in the notes.

Note the visual observation of the amount of particulates in the sample collected immediately after collection and before partitioning into individual sample bottles. If foreign contaminants including plants or animals are in the processing bucket, avoid pouring them into the sample bottles and note what was seen in the sample bucket in the field notes

Samples are placed on ice immediately after collection and are processed at the District Laboratory. Samples must be processed within four hours of collection. Processing times and the ID of the collector and processor for each sample must be recorded in the field notebook. If processing times exceed the four-hour limit, the amount of time exceeded must be recorded in the comments of the header sheet. If foreign contaminants including plants or animals are in the processing bucket, avoid pouring them into the sample bottles and note what was seen in the sample bucket in the field notes. Note the visual observation of the amount of particulates in the sample collected immediately after collection and before partitioning into individual sample bottles.

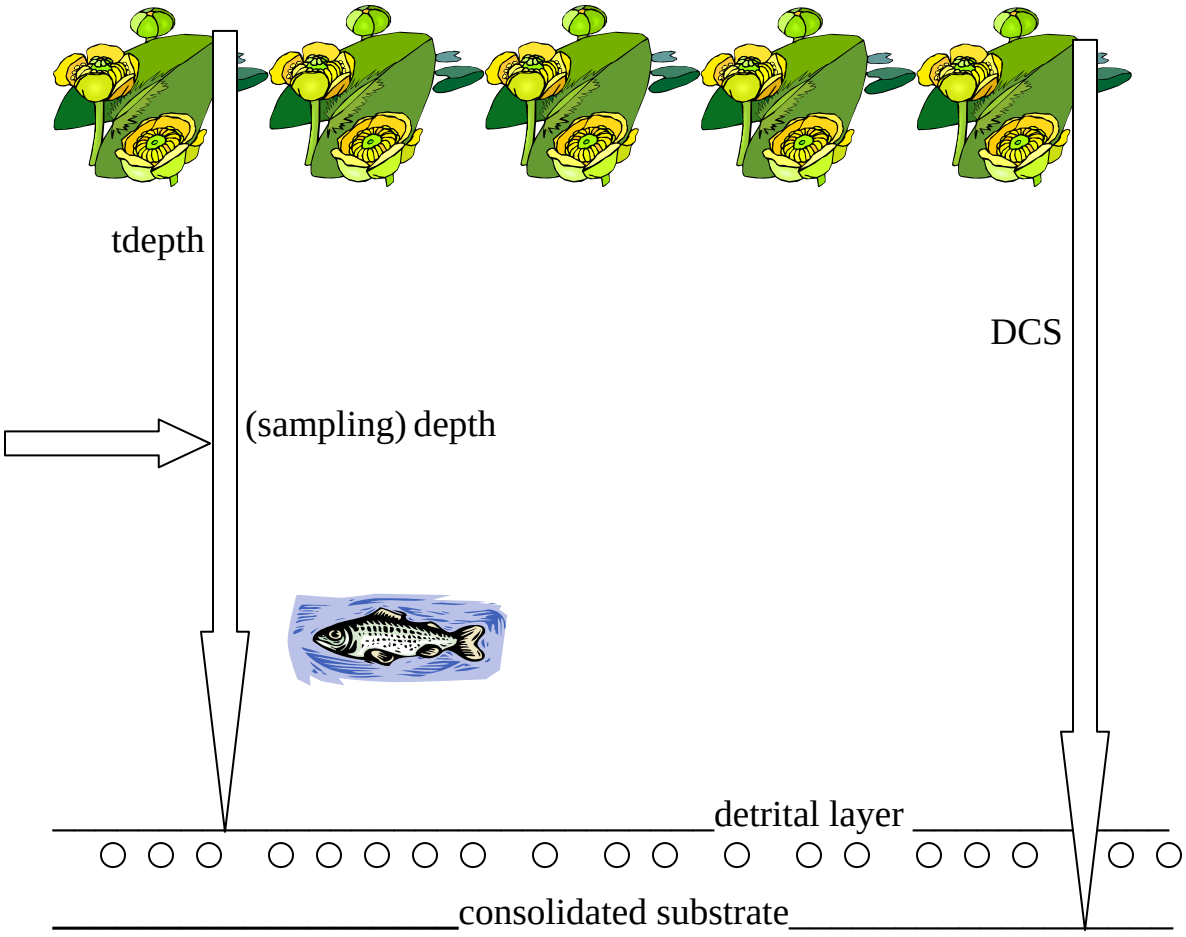

Figure 7.1. Definition of Depth Measurements:
Example of depth measurements at a station with a detrital layer present (0.10 m), a depth to consolidated substrate (DCS) of 1.0 m, a tdepth (total depth) of 0.90 m, and a depth (sampling depth = half of tdepth) of 0.45 m.

7.1.1.1 Supplemental Guidance for Collection of Marsh Samples for the EVPA Project

The following table is intended to provide guidance for the collection of Marsh samples for the EVPA project. This information is not intended to be all inclusive of the entire range of conditions experienced in the field. It should provide enough information to address some of the more common issues encountered by the sampling personnel. The guidelines below are an attempt to equip the sample collection personnel with enough information to collect samples while excluding periphyton and detrital matter that are not a part of the water column.

Table 7.1 If - Thens for Marsh Sampling

The vegetation cover at interior marsh sample collection stations often varies spatially and temporally. The vegetation cover often limits the availability of suitable gaps large enough to collect water quality samples by hand. The diameter of the gap in the vegetation where the sample is collected should be at least two 1L bottle heights. The 1L bottle is then used to fill the 2L bottle, and is then filled. • If a gap is not large enough for the 1L bottle then leave the area to find a gap of sufficient size. • If in the rare instance that a gap is not available for the 1L bottle size, then use a 250 mL bottle to fill the bottles. • If the visibility of the water column is low, then the collector should collect sample using a smaller bottle.
The collector should take depth measurements as they approach the sampling area so that they have a feel for the relative depth of the area; collect sample from area with total depth close to the relative depth of the area.
If using a 60 mL bottle to collect sample (TPO4 only – sample will not be in processing bucket for description), then use a clear plastic disposable beaker to collect a small volume of the sample to document its description, and then discard contents of the beaker.
If the sample collector is unable to collect sample without disturbing detrital material after several attempts, then the other collector should collect the sample; document the collector in the notes.
If the wind is blowing so hard that there are ripples within the sampling area, collect sample away from the rippled area.
After a thorough search of the area, if there is no clear delineation between the DCS (depth to consolidated substrate) and the total depth, then do not collect sample. In this case, there is no bulk water as defined in the monitoring plan.
If unsure of how to handle a situation, call and consult the project manager.

7.1.1.2 Parameters

Table 7.1 lists the project parameters, matrices, preferred methods, detection limits, precisions, and accuracies.

Table 7.2 Surface Water Grab Sample Parameters, Analytical and Target MDL and QC Limits

Parameter (filtered (f) or unfiltered (u))	Preferred Method	Preferred Detection Limit	Precision (% RPD)	Accuracy (% Recovery)
Alkalinity (u)	EPA 310.1	1 mg/L	<10	90-110
Alkaline Phosphatase (u)	SFWMD 3160.1	1 nM/min-mL	<10	NA
Ammonia (f)	SM4500NH3H	0.009 mg/L	<10	90-110
Calcium (f)	SM3120B	0.2 mg/L	<10	90-110
Chloride (f)	EPA 300.0	0.1 mg/L	<10	90-110
Color (f)	SM2120B Modified	1 PT-Co unit	<5	90-110
Dissolved Organic Carbon (f)	EPA 415.1	1 mg/L	<10	90-110
Magnesium (f)	SM3120B	0.1 mg/L	<10	90-110
Nitrite (f)	SM4500-NO_2^-B	0.004 mg/L	<10	90-110
Nitrite +Nitrate (f)	SM4500-NO_3^-F	0.004 mg/L	<10	90-110
Ortho Phosphate (f)	SM4500-P F	0.004 mg/L	<10	90-110
Potassium (f)	SM3120B	0.1 mg/L	<10	90-110
Silica (f)	SM4500-Si D Modified	0.05 mg/L	<10	90-110
Sodium (f)	SM3120B	0.2 mg/L	<10	90-110
Sulfate (f)	EPA 300.0	0.1 mg/L	<10	90-110
Total Dissolved Kjeldahl Nitrogen (f)	EPA 351.2 ATP	0.05 mg/L	<10	90-110
Total Dissolved Phosphate (f)	SM4500-P F	0.002 mg/L	<10	90 – 110
Total Dissolved Solids (u)	SM2540C	22 mg/L	<10	NA
Total Iron* (u)	SM3111B	3.0 ug / L	<10	90-110
Total Kjeldahl Nitrogen (u)	EPA 351.2 ATP	0.05 mg/L	<10	90-110
Total Organic Carbon (u)	EPA 451.1	1.0 mg/L	<10	90-110
Total Phosphorus (u)	SM4500-P F	0.002 mg/L	<10	90-110
Total Suspended Solids (u)	EPA 160.2	3 mg/L	<20	NA
Turbidity (u)	SM2130B	0.1 NTU	<5	90-110

Matrix is water for all parameters
RPD = Relative Percent Difference
* Digestion Method = SW-3015

7.1.2 In situ measurements

7.1.2.1 Parameters

Table 7.2 lists the project parameters, matrices, preferred methods, detection limits, precisions, and accuracies.

Table 7.3 In Situ Measurements, Methods and Target Limits

Parameter/Matrix	Preferred Method	Preferred Range	Preferred Precision	Preferred Accuracy
Depth/Water	SFWMD FSQM 5.15	NA	0.01	0.01
Temperature/Water	FDEP SOP FT1400	NA	0.01	± 0.2 º C
pH/Water	FDEP SOP FT1100	NA	0.01	± 0.2 pH units
Dissolved Oxygen/Water	FDEP SOP FT1500	NA	0.01	± 0.2 mg/L
Specific Conductivity/Water	FDEP SOP FT1200	NA	0 .1	± 5 %

7.1.2.2 Project Specific Guidelines

To obtain the physical measurements of the water, place the multiparameter probe at a depth of ½ the water column depth in close proximity to where the grab sample is collected, or at 0.5 m. if tdepth is > 1.0 m. If the depth of water is too shallow for a vertical reading, the sampler should hold the probe horizontally.

Measurements collected from the helicopter pontoon are not acceptable unless it is necessary to collect samples from the pontoon.

Header sheets and field note sheets should be printed on waterproof paper.

Unknown tdepth values greater than 1 meter must be written in the comments (“tdepth > 1 m “) of the header sheet (as LIMS does not accept symbols), as well as values for stations with tdepth values less than or equal to 0.10 m (“no sample, tdepth less than 0.10 m”).

8.0 MONITORING FREQUENCIES BY SITE AND PARAMETER

The sampling schedules for the referenced monitoring sites and parameters are depicted in Table 8-1.

Table 8.1 Monitoring Parameters and Frequencies

Site	Matrix	Collection Method	Frequency	Parameters
All 15 stations	Water	Grab	Monthly	Temp, DO, pH, Sp. Cond.,ALKA, APA, CA, CL, COLOR, DOC, K, MG, NA, NH4, NO2, NOX, OPO4, SIO2, SO4, TDKN, TDPO4, TDS, TKN, TOC, TPO4, TSS, TURB
All 15 stations	Water	Grab	Quarterly	TOTFE

9.0 QUALITY CONTROL AND CUSTODY

All quality control (Table 7.2 and 7.3), documentation, processing, and custody protocols will be performed in accordance with the DEP SOPs specified per the DEP Quality Assurance Rule, 62-160.200 & .320, F.A.C., and the District FSQM. The exceptions to the protocol for this project are included in the definitions listed below.

The EVPA Area 1 sampling event requires two separate sampling trips due to the time and fuel constraints of the helicopter. These sampling trips usually occur on two separate days. Collect a field-cleaned equipment blank (FCEB) for each day's sampling event. When only one sample is processed (and it is not necessary to rinse equipment), process an equipment blank (EB) in place of the FCEB.

1. **Equipment Blank (EB)** - A sample composed of approximately 2.5 liters of deionized water used to evaluate the effectiveness of laboratory decontamination. Equipment blanks are collected at the beginning of the processing procedure at the District Lab, must be labeled, and are required quarterly (Mar, June, Sept, Dec). Equipment blanks are prepared by pouring deionized water into the sample collection container (2L and 1000 ml bottles) and through each piece of sampling equipment (processing bucket) without rinsing (except for the filter, which is rinsed with at least 30 ml deionized water) and then collecting the rinsate. An EB is handled as a routine sample and is labeled, filtered, and acidified identically to the in situ samples. Equipment blanks are also required (and replace a FCEB)

when an FCEB is not done due to only one full parameter set and no rinsing of equipment.

2. **Split Sample (SS)** - One sample, which has been divided during processing to make two (in this case) or more chemically identical samples. Samples are split by special request only. For the quarterly TPO4 splits to FDEP, the three liters of sample collected per station is an adequate amount to fill the additional bottle submitted as the split. Thoroughly mix the sample throughout the processing procedure.
3. **Replicate Sample (RS)** - An additional sample collected nearly simultaneously from the same sampling station, which is used to evaluate sampling precision and field variability. Two RS are collected from one station quarterly (Mar, June, Sept, Dec), and from one station when new staff collect samples for the first time.
4. **Field Cleaned Equipment Blank (FCEB)** - A sample composed of approximately 2.5 liters of deionized water used to evaluate the decontamination of the sample collection container and the sampling equipment; in this case, the polyethylene bucket. After processing a sample, rinse the polyethylene bucket twice with deionized water and then process the FCEB identically to an in situ sample. One FCEB is collected per sampling event. An EB replaces the FCEB when a sampling event consists of only one sample.
5. **Field Blank (FB)** – A field blank may be required on day two (day 1 includes the canal station) when due to low total depth values, there is not a full set of parameters (thus, no FCEB or EB). On day two, in anticipation of the need for an FB, fill a 250 mL bottle with DI water before leaving the lab. While out in the marsh at one of the stations, open this bottle, keep it open several seconds or the time it takes the collector to collect a sample, and then fill a 60 mL "TPO4" bottle with the DI after rinsing it once with DI water.

10.0 DATA AND RECORDS MANAGEMENT

After the data validation process, all data are archived in DBHydro. Field notes are maintained on an internal server either by scanning actual field note pages. Original copies of field documentation and header sheets are archived for the life of the project in accordance with District Records Retention Policy and WQM Records Storage, archival and Retrieval SOP**.**

11.0 PROJECT REPORTING

The geometric mean TPO4 concentration for each month is calculated for the stations sampled (up to 14 stations) and compared to the interim and long-term levels specified in the Settlement Agreement. The results are reported in the Quarterly Settlement Agreement Report and presented to the TOC on a quarterly basis.

The Quarterly Settlement Agreement Report consists of tables and graphs, which include data for the 24-month period ending with the most recent calendar quarter for which data are available. The report narrative explains the basis for the calculations and describes

any excursions or unusual events, including a description of locations and reasons samples were not collected during any particular reporting period (e.g., dry stations).

Charts and tables are posted on the TOC web site:
(http://www.sfwmd.gov/org/ema/toc/index.html).

12.0 PROJECT CONTACTS AND RESPONSIBILITIES

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The field project manager for this project is Kristin Larson. The field project manager is responsible for maintaining this document and making sure that any changes are well documented and communicated to the field staff and other parties as necessary.

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13.0 Revisions and Modifications

1.) The initial contract (C-12738) with the USFWS for sampling in WCA1 for the EVPA project began October 1, 2000 and ended September 30, 2003.

2.) The depth to consolidated substrate (DCS) (referred to as total water depth (twd) initially in the field notes) was first recorded in the black book notes August 9, 2004 per request of the USFWS. The DCS is defined as the sum of the total depth and the detrital layer (if present). The term "DCS" was coined at a meeting between the USFWS and the District. The total depth and DCS may be the same value.

3.) Beginning with the January 10, 2005 collection, the parameters Cl and SO4 were added to the "TPO4 only" list for stations with depths between 0.10 and 0.20 m (approved by D. Struve). These parameters were added to match the LOXA project. LOXA is composed of 40 stations within the Refuge, began June 7, 2004 and is expected to last 3 years.

4.) Beginning with the February 6th, 2006 collection, the following occurred: samples were collected outside of the four PVC poles marking each station; samples were collected using a 2L and 1L bottle and the 1L bottle was used to fill

the 2L bottle; only once rinse (rather than three) of the field collection bottles was initiated; and the "Paluga" PVC pole was designated the pole to measure tdepth and DCS.

5.) Suggested clarification language in 7.1.1 (four paragraphs preceeding the section's last paragraph beginning with "The sample…" and ending with the paragraph "Note the visual…") was based on the excerpts from the marsh sampling workshops (9/26/06 and 2/9/06), the Marsh Sampling Protocol, and the monitoring plan. The language was approved by the TOC 6/16/06.

Kristin Larson, Field Project Manager **Date**

Linda Crean, Water Quality Monitoring Division Director **Date**

David Struve, Water Quality Analysis Division Director **Date**

Julianne LaRock, Water Quality Assessment Division Director **Date**

Delia Ivanoff, Quality Assurance Officer **Date**

Linda Lindstrom, Environmental Resource Assessment Department Director **Date**